



**{In Archive} RE: Power point presentation**

**Van Kelley** to: Ray Leissner  
Cc: "craig w. holmes"

01/24/2012 12:34 PM

From: Van Kelley <vkelly@intera.com>  
To: Ray Leissner/R6/USEPA/US@EPA  
Cc: "craig w. holmes" <pommelhouse@sbcglobal.net>

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1 attachment



EPA approach 1 18 2012 Final.pdf

Ray

Sorry for the delayed response, I was out yesterday. I have attached the pdf of the presentation.

We put a significant amount of thought into developing a conservative analytical approach that we believe goes beyond the requirements of the rules set out for EPA's review of an aquifer exemption. You will see that the approach would develop site-specific properties and the time frame for analysis we have proposed is consistent with the EPA's letter to the TCEQ and 40 CFR 144.6.

It was a pleasure to meet you and look forward to developing a constructive working relationship.

Van Kelley

From: Ray Leissner [mailto:[Leissner.Ray@epamail.epa.gov](mailto:Leissner.Ray@epamail.epa.gov)]  
Sent: Thursday, January 19, 2012 9:36 AM  
To: [vkelly@intera.com](mailto:vkelly@intera.com)  
Cc: Scott Ellinger  
Subject: Power point presentation

Van,

It was good to meet you yesterday. Unfortunately I forgot to get a copy of your power point presentation. Could you email that to us? Thanks.

Ray Leissner, Env. Eng.  
Ground Water / UIC Section (6WQ-SG)  
(214) 665 - 7183  
USEPA, Region 6

The FIRST STEP in protecting your ground water is to have your well tested.

# UEC Aquifer Exemption Boundary

**EPA Region 6  
Dallas  
1/18/12**





# Aquifer Exemption Boundary

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- **Objective:**

- Demonstrate that no existing domestic well that is currently used for human consumption is using water from the AE Area
- Demonstrate that no existing domestic well could produce water from the AE Area for the entire mine life

- **Approach:** Use accepted EPA capture zone methods and site data to delineate capture zones



# Capture Zone Time Frame

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- We will perform calculations of capture for the 8 year mine life provided in the issued permit.
- This is consistent with:
  - 40 CFR 146.6
  - Region 6 EPA's response to UEC's Application received on May 27, 2011





# Capture Zone Approach

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1. Tabulate the rural domestic wells to be considered in the AOR and detail what strata each is completed in, where known.
2. Calculate average hydraulic gradients in each stratum
3. Calculate the 8 year capture zones for each rural domestic well and plot relative to the AE Boundary

# 8 year Capture Zone

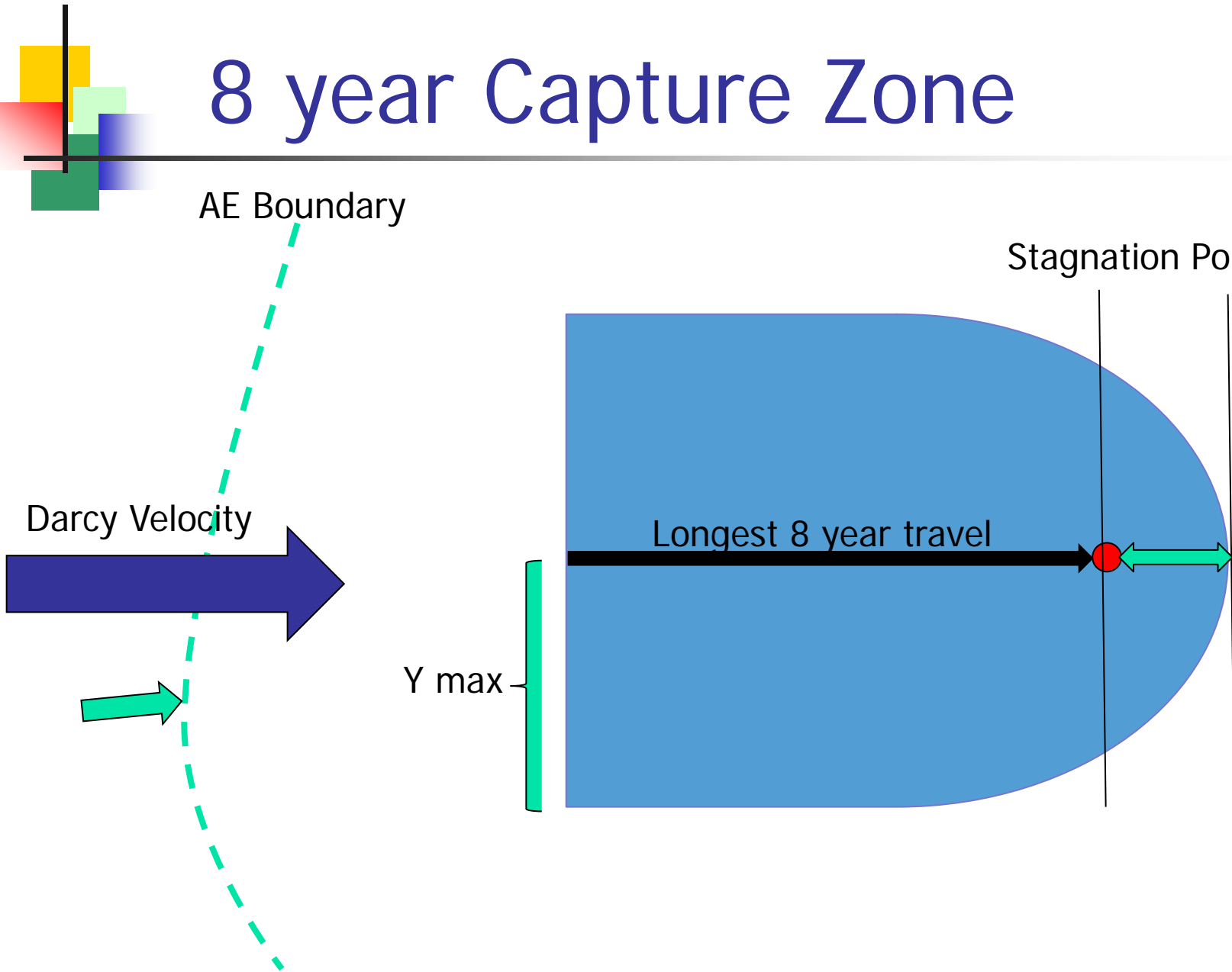
AE Boundary

Stagnation Point  $X_o$

Darcy Velocity

Longest 8 year travel

Y max





# Variables / Nomenclature

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$Q$	=	Extraction rate at rural/domestic well ( $L^3/T$ )
$K$	=	Average hydraulic conductivity of stratum ( $L/T$ )
$b$	=	Average thickness of stratum ( $L$ )
$T$	=	Average transmissivity ( $K * b$ ) of stratum ( $L^2/T$ )
$i$	=	Average hydraulic gradient ( $L/L$ )
$\Phi$	=	Porosity of stratum ( $L^3/L^3$ )
$v$	=	Average seepage velocity ( $L/T$ )
$x$	=	Coordinate parallel to seepage velocity direction
$y$	=	Coordinate normal to seepage velocity direction



# Capture Model Properties

Stratum	Average Thickness (ft)	Average Hydraulic Gradient	
		Magnitude (ft/ft)	Direction (degrees)
A	65	TBD	TBD
B	36	TBD	TBD
C	36	TBD	TBD
D	80	TBD	TBD

- We have good sand hydraulic properties from two large-scale pump tests and a calibrated flow model of the B-sand





# Rural/Domestic Use

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- 2009 Water use survey data (Kevin Kluge, TWDB)
- Based upon municipal use and population – TWDB does not calculate a county gpd/capita for rural/domestic
- Goliad County = 119 gpd/person
  - State average = 150 gpd/person
- Average household in Goliad County is comprised of 2.6 people
  - <http://www.goliadcc.org/index.php/re-location-info.html>

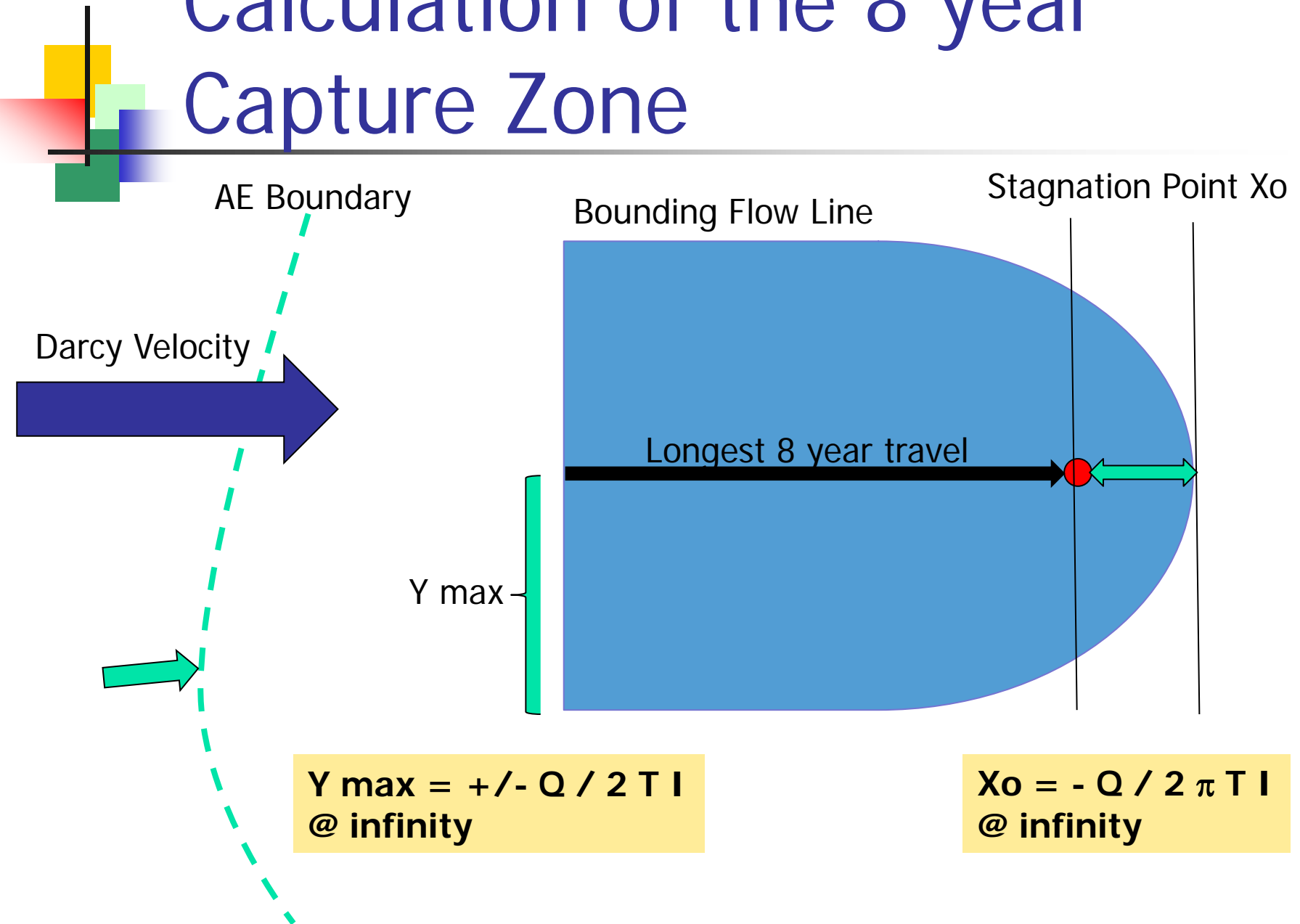


## Rural/Domestic Use

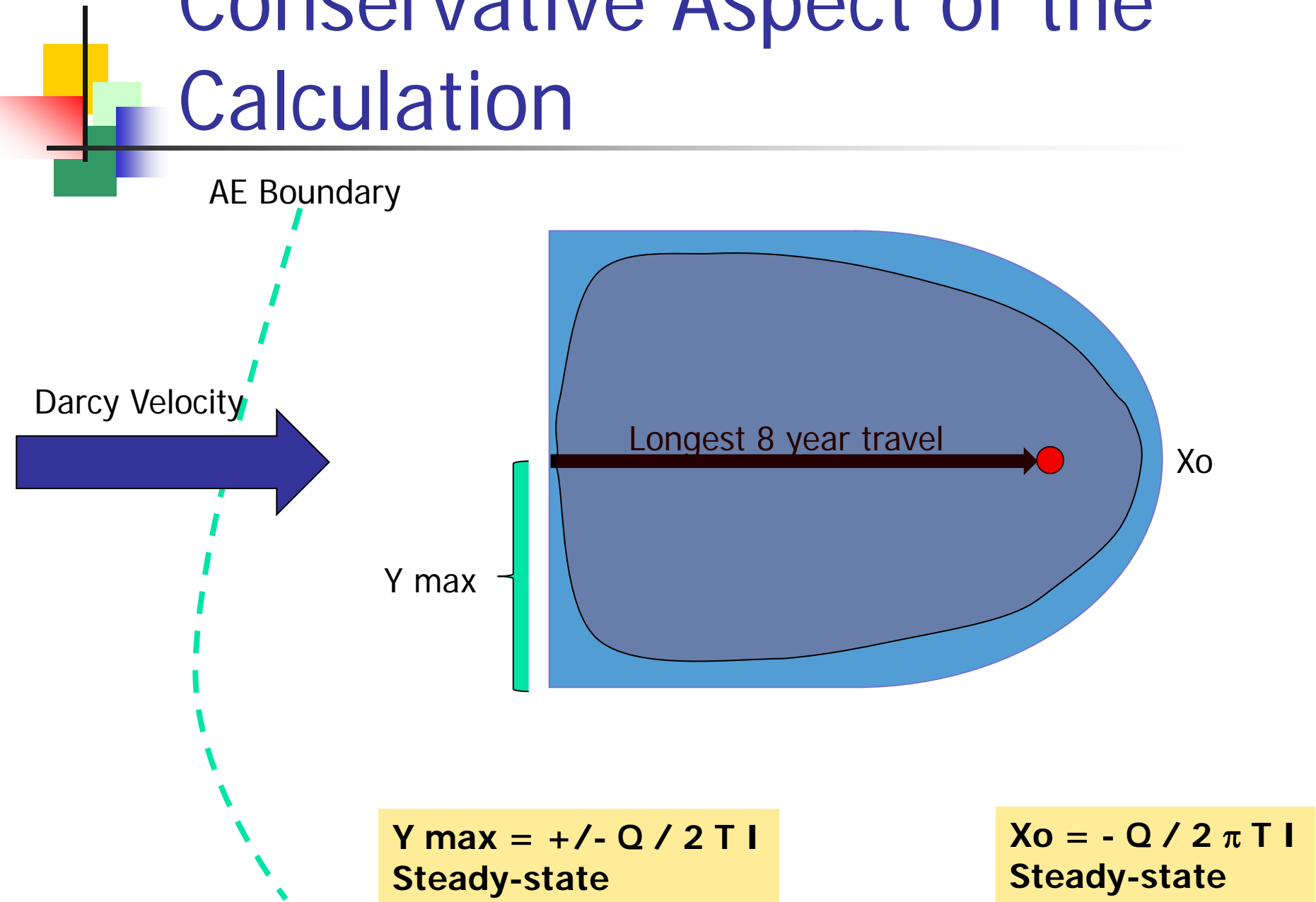
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- $2.6 \text{ people} \times 119 \text{ gpd/person} = 309.4 \text{ gpd}$
- $309.4 \text{ gpd} = 0.215 \text{ gpm} = 41.4 \text{ ft}^3/\text{day}$

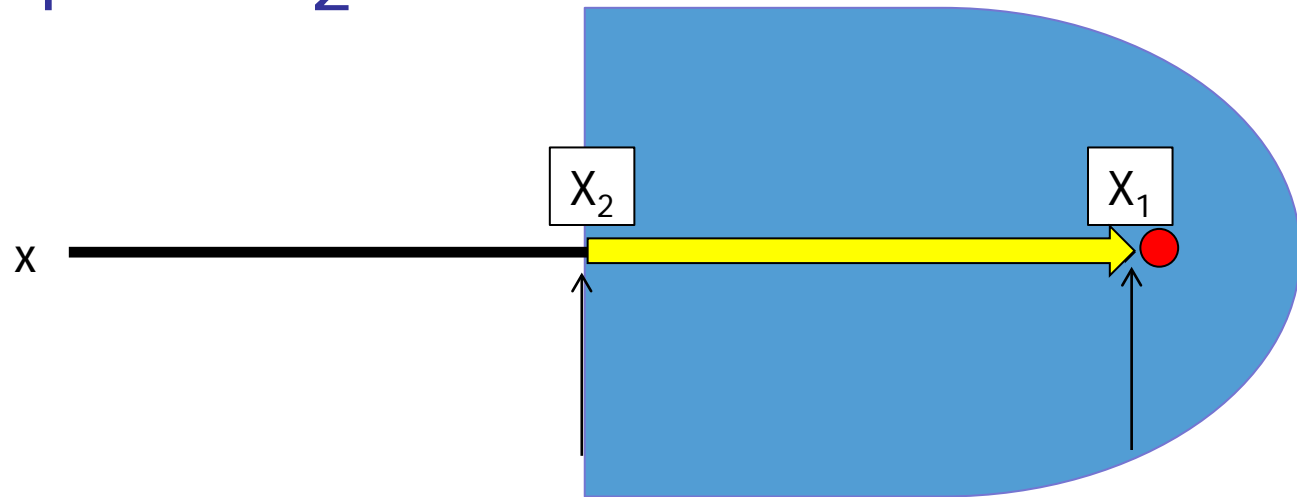
# Calculation of the 8 year Capture Zone



# Conservative Aspect of the Calculation



# Travel Time Calculation from $X_1$ to $X_2$



Travel Time from  $x_2$  to  $x_1$  =

$$\{vx_2 - Q/2\pi b\phi [\ln (vx_2 + Q/2\pi b\phi)]\} / v^2 -$$

$$\{vx_1 - Q/2\pi b\phi [\ln (vx_1 + Q/2\pi b\phi)]\} / v^2$$



# Product to EPA

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- Review all wells in the AOR and provide verification of where the wells are completed where we have data
- Develop reasonable estimates of:
  - Aquifer properties
  - Hydraulic gradients
  - Rural/domestic pumping rate





# Product to EPA

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- Provide plots of the 8 year capture zones for each rural/domestic well in the AOR
  - If a well is known to be completed in a particular stratum, calculations for that well will be limited to that stratum
  - If completion of a well is unknown, the calculations will be performed assuming all four potential strata
- Technical memorandum documenting results

